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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/997,463 | 11/29/2001 | Barry L. Carlson | 1662-46400 JMH (P01-3705) | 6167 |
| 22879 | 7590 | 07/22/2005 | EXAMINER | |
| HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400 | | | GODDARD, BRIAN D | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2161 | |

DATE MAILED: 07/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/997,463

Applicant(s)

CARLSON, BARRY L.

Examiner

Brian Goddard

Art Unit

2161

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This communication is responsive to the Amendment filed 05 May 2005.
2. Claims 1-24 are pending in this application. Claims 1 and 13 are independent claims. In the Amendment filed 05 May 2005, claims 1 and 13 were amended. This action is made Final.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-24 are rejected under 35 U.S.C. 102(b) as being anticipated by the article entitled "Data Partitioning and Load Balancing in Parallel Disk Systems" by Scheuermann et al. (hereinafter 'Scheuermann')

Referring to claim 1, Scheuermann discloses a method of performing file maintenance on a plurality of storage devices as claimed. See Sections 1-3 of Scheuermann for the details of this disclosure. Scheuermann teaches "a method [load balancing algorithm (See Section 3)] of performing file maintenance on a plurality of storage devices ['disks' (See Figs. 3-4)], comprising:

(a) measuring ['Heat tracking' (See Section 3.3)] file system parameters [H - 'heat' of blocks & extents (See Sections 1-3)];

(b) determining [See Sections 1 & 3 and Step 5 of Fig. 5] periods of low disk activity [low heat (i.e. disk's queue is empty)]; and

(c) upon determination of low disk activity period [See Step 5 of Fig. 5 {also, processing is done by a background demon – a low priority thread that does not interfere with regular disk operations (See Sections 1.2 & 3.2)}], performing a file maintenance action ['Disk cooling' (See Section 3.2)] based on said system parameters;

wherein (a), (b), and (c) are performed automatically [See Sections 1-3]; and wherein said file maintenance action comprises at least file defragmentation [See Phase A & Phase B (Sections 2.1-2.2) and discussions of claims 7-11 below]" as claimed.

Referring to claim 2, Scheuermann teaches the method of claim 1, as above, wherein (a) includes maintaining a list of the files with the most I/O ['hot blocks' (See Sections 3.2-3.3)] as claimed.

Referring to claim 3, Scheuermann teaches the method of claim 2, as above, wherein (c) includes computing the average number of I/O cycles on the storage devices ['average disk heat' (See Fig. 5)] and moving a file from one disk to another [cooling] based on said average [See Section 3.2 & Fig. 5] as claimed.

Referring to claim 4, Scheuermann teaches the method of claim 3, as above, wherein said file is moved to the disk ['target disk'] that results in the smallest deviation from the average [See Step 5 & ¶ 3-4 of Section 3.2] as claimed.

Claim 5 is rejected on substantially the same basis as claim 2. See the discussion regarding claim 2 above, as well as the portions of Scheuermann cited therein, for the details of this disclosure.

Referring to claim 6, Scheuermann teaches the method of claim 1, as above, wherein (a) includes maintaining a fragmentation list [partition list (See Section 2 & Sections 3.1-3.2)] of files that have been fragmented [into 'extents'] as claimed.

Referring to claim 7, Scheuermann teaches the method of claim 6, as above, wherein for each fragmented file [i] in the fragmentation list, a value [SW_i] is stored, said value being representative of the ratio of the size of the fragmented file [L_i] to the number of extents that are necessary to store the file [SU_i] on the storage devices [See Section 2.3, Step 4a] as claimed.

Referring to claim 8, Scheuermann teaches the method of claim 7, as above, wherein (c) includes selecting for defragmentation [See Phase A & Phase B (Sections 2.1-2.2)] a fragmented file [i] that has a lower ratio [P_{opt,i}] than other fragmented files as claimed.

Referring to claims 9 & 10, Scheuermann teaches the method of claim 6, as above, wherein (c) includes selecting a fragmented file to be defragmented [See claim 8 above] and storing said defragmented file on a different storage device, or on the same storage device, than was used to store said fragmented file [See 'Load balancing' in Section 3] as claimed.

Referring to claim 11, Scheuermann teaches the method of claim 9, as above, wherein (c) includes determining on which storage device to store said defragmented file ['target disk'], said storage device determination including:

(c1) determining the amount of free space ['FREE' (See Section 3.1)] on each of said storage devices;

(c2) computing the average amount of free space on said storage devices [consequence of average disk heat in cooling algorithm (See Figs. 3-4)]; and

(c3) selecting the storage device on which to store said defragmented file [See Steps 3-4 of cooling algorithm]... as claimed.

Referring to claim 12, Scheuermann teaches the method of claim 1, as above, where (b) includes examining a queue of pending storage device I/O requests [See ¶ 3 of Section 3.2] to determine whether any I/O requests are pending [See Step 5 of Fig. 5] as claimed.

Claim 13 is rejected on substantially the same basis as claim 1 above. See the discussion regarding claim 1, as well as the portions of Scheuermann cited therein, for the details of this disclosure. Specifically, Scheuermann's algorithms are implemented through software stored on a computer system comprising a processor, RAM, and a plurality of storage devices [See Section 4] as claimed.

Claims 14-24 are rejected on the same basis as claims 2-12 respectively, in light of the basis for claim 13. See the discussions regarding claims 1-13 above for the details of this disclosure.

Response to Arguments

4. Applicant's arguments filed 05 May 2005 have been fully considered but they are not persuasive.

Referring to applicant's remarks on page 6 regarding the Section 102 rejections over Scheuermann: Applicant argued that Scheuermann does not teach file defragmentation, as required by amended claim 1.

The examiner disagrees for the following reasons: Applicant's argument is a mere statement that, "Applicant has reviewed the citations provided in the Office action that purportedly relate to defragmentation, but Applicant disagrees that Scheuermann teaches file defragmentation" without more. (Page 6 of response filed 05 May 2005) Applicant has provided no evidence, facts or logic leading to his conclusion, and therefore has failed to rebut the *prima facie* case of anticipation. Absent any reasoning to support applicant's conclusion, the examiner is unconvinced.

Although Scheuermann does not explicitly use the term "defragmentation", one of skill in the art would easily recognize Scheuermann's disclosed process as defragmentation. On page 2 (Paragraph 0005) of the instant specification, applicant describes "defragmentation" as, "the process of moving the various non-contiguous units of a file into a single contiguous space on the storage device. File defragmentation generally increases the performance of the file subsystem because fewer I/O cycles are needed to access the file." This is a typical and accurate definition of defragmentation. Scheuermann's process as described in the above-cited portions of the article moves the various non-contiguous units of a file into a single contiguous space on a storage device to increase performance of the file subsystem by speeding access to the file. Therefore, one of skill in the art would recognize Scheuermann's disclosed process as "file defragmentation" as claimed.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Goddard whose telephone number is 571-272-4020. The examiner can normally be reached on M-F, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Safet Metjahic can be reached on 571-272-4023. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2161

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bdg
20 July 2005


HOSAIN ALAM
SUPERVISORY PATENT EXAMINER